The MARS spatial database (MARSgeoDB) supports analyses of European waters, providing common reference spatial layers and selected data on indicators of pressures, state and impacts of European waters. It is developed within the European research project MARS (Managing Aquatic ecosystems and water Resources under multiple Stress) in accordance with the WISE (Water Information System in Europe) concept. It is built on the ECRINS (European Catchments and Rivers Network System) spatial database (from the European Environment Agency), consisting of river segments, lakes and functional elementary catchments (FECs). It includes other available European spatial layers, such as River Basin Districts (RBDs), RBD sub-units, coastlines, regions, water bodies as reported under the WFD (Water Framework Directive) in 2010 and WISE SoE (State of Environment) locations.

For spatial objects representing waters in the MARSgeoDB we compiled indicators of pressure, state and impact: physical-chemical indicators, ecological quality ratio, ecological status, chemical status, hydromorphological status, land use, population, nitrogen and phosphorus diffuse pollution, Eurostat agricultural data, UWWTD (Urban Waste Water Treatment Directive) point sources of organic pollution, E-PRTR (The European Pollutant Release and Transfer Register) point sources of large emissions to water, hydro-morphological changes/naturalness of rivers, meteorological and hydrological characteristics. To calculate pressures acting on selected locations on waters we derived surface water receiving areas (polygons representing catchments/hinterlands). We assigned broad ecological types to rivers (20 types) and lakes (15 types) objects in the MARSgeoDB using abiotic criteria as proposed by EEA ETC/ICM (European Topic Centre on Inland, Coastal and Marine waters) in 2015. A corresponding water body code and national ecological types were assigned as well.

Spatial and associated attribute data were quality checked, unified when needed, harmonised and interlinked.
Dataset: MARS spatial database

Keywords: Terrestrial Hydrosphere
DPSIR, WFD, WISE SoE, watershed characteristics, rivers/streams, lakes/reservoirs, ground water, ecological status, water quality/water chemistry, discharge/flow, land use/land cover, population density, precipitation, air temperature, agriculture production

ISO topic category according to ISO 19115:
Farming, Boundaries, Climatology/Meteorology/Atmosphere, Elevation, Environment, Inland Waters
Technical and administrative specifications

data format: Access
   others/details: ESRI geodatabase feature classes
operating system: all Windows systems
data language: English
current access level: web (public)
   web address (URL): http://www.fgg.uni-lj.si/~mars/MARSgeoDB/MARSgeoDB_v2.zip
   currently available through GBIF: no
   exchange planned: no
   data in data repository: no

Do you plan to publish the data on the Freshwater Biodiversity Data Portal: no

update level: completed
documentation:
   type: manual
   language: English

contact details:

   metadata contact person: Lidija Globevnik
   first, last name: Lidija Globevnik
   phone: +386-41-738623
   email: lidija.globevnik@fgg.uni-lj.si
   institution: University of Ljubljana, Faculty of Civil and Geodetic Engineering
   address: Jamova 2
   postal code, city: 1000 Ljubljana
   country: Slovenia
   web address: https://www.uni-lj.si/academies_and_faculties/faculties/2013071111381151/

   technical contact person: Lidija Globevnik
   first, last name: Lidija Globevnik
   phone: +386-41-738623
   email: lidija.globevnik@fgg.uni-lj.si

   scientific contact person: Lidija Globevnik
   first, last name: Lidija Globevnik
   phone: +386-41-738623
   email: lidija.globevnik@fgg.uni-lj.si
Intellectual property rights and citation

(if the dataset is already published):

dataset creator (data compiler):
  contact name: Lidija Globevnik
  contact email: lidija.globevnik@fgg.uni-lj.si
  contact institution: University of Ljubljana, Faculty of Civil and Geodetic Engineering

data contributors to/owners of this dataset:

citation of this dataset:
  author(s): Lidija Globevnik, Maja Koprivsek, Luka Snoj
  title: MARS spatial database - European data base for management of water resources under multiple stress
  year: 2016
  version (if applicable): 2

citation of the metadata:
  author(s): Globevnik L., Koprivsek M. & Snoj L.
  title and journal (name, number, pages): Metadata to the MARS spatial database. Freshwater Metadata Journal 0: 0-0
  year: 0000
  doi (if applicable): https://doi.org/10.15504/fmj.0000.0

comments: The use of the content for commercial or non-commercial purposes is permitted free of charge, provided that the source is acknowledged.
General data specifications

regional coverage of the dataset:
- scale of the dataset: continental
- continents: Europe

spatial extent (bounding coordinates):
- southernmost latitude [°]: 33.727485
- northernmost latitude [°]: 71.185599
- westernmost longitude [°]: -24.533308
- easternmost longitude [°]: 42.642135
- minimum altitude: -10 metres
- maximum altitude: 4442 metres

countries: Europe: Åland Islands, Albania, Andorra, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Gibraltar, Greece, Guernsey, Hungary, Iceland, Ireland, Isle of Man, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Moldova, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Russia, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, Vatican City, Kosovo

comments: EU-28 + NO, IS, CH, LI, AD, RS, BA, AL, MK, ME and XK + Turkey (without Euphrates and Tigris River basins) + part of Syria and Lebanon (Asi River basin) + parts of Russia (Pregolya, Daugava, Neva, Oulujoki, Kovda and Lotta River basins), Belarus (Daugava, Neman, Vistula River basins), Ukraine (Danube and Vistula River basins), Moldova (Danube River basin)

Some layers (feature classes) are not covering all the countries listed above.

comments: Different datasets are covered by different data frame. Most pressure and state data are for year 2010. Climatological data are from periods 1961-90, 1950-2000 and 2001-2010.
Site specifications

coordinate system/grid data: projected, others others: ETRS89_LAEA
  datum (e.g. WGS84): D_ETRS_1989
  grid data available: yes
  resolution: 1
  unit: km
  comments: Grid data are available for climatological data, land cover data, altitude as well as slope, population density and population count. Data of different spatial resolutions are resampled on 1 km grid.

number of sites: >1000
comments: There are different numbers of sites in different layers (feature classes), for example: 16694 WISE SoE rivers quality stations, 26794 UWWTD discharge points, 5043 dams, 15016 E-PRTR facility report points. All compiled data have been linked to the ECRINS catchment and river network system when possible.
Climate and environmental data

climate related data:
available per: per catchment
spatial resolution of the data (if not catchment/site related):
1 km

others: Data are available per catchment (FEC and hinterland) and in grid (in different original resolutions depending on the source and resampled to 1 km grid).

available parameters: mean annual temperature January, July
Source: WorldClim v1.4, JRC Agri4cast
minimal, maximal and mean winter and summer temperatures
Source: WorldClim v1.4, JRC Agri4cast
mean annual precipitation
Source: FAO v1.4, The British Atmospheric Data Centre, JRC Agri4cast
winter and summer precipitation
Source: GPCC, The British Atmospheric Data Centre, JRC Agri4cast

environmental data:
available parameters per catchment: catchment size
Source: ECRINS v1.1
availability parameters per catchment: catchment geology
Source: BGR - IHME 1500_v11, JRC - SGDBE4, WFD reporting, WRc
availability parameters per catchment: catchment land cover/land use
Source: CLC2006 v17, CLC2000Greece, GlobCorine2009, EEA Copernicus land cover/land use
availability parameters per catchment: population density
Source: EEA v17 - 2009
availability parameters per catchment: presence of barriers/dams/reservoirs (fragmentation)
Source: ECRINS v1.1, ESRI basemap
availability parameters per catchment: hydrological regime/flow regime
Source: PCR-GLOBWB (DELTARES, NL)
availability parameters per site: catchment land use upstream of sampling site
Source: CLC2006 v17, CLC2000Greece, GlobCorine2009, EEA Copernicus land cover/land use
availability parameters per site: catchment land use along a buffer strip (100m width on both sides) upstream (10km) of the sampling site
Source: CLC2006 v17, CLC2000Greece, GlobCorine2009, EEA Copernicus land cover/land use
availability parameters per site: river length
Source: ECRINS v1.1
availability parameters per site: distance to source
Source: ECRINS v1.1
availability parameters per site: distance to mouth
Source: ECRINS v1.1
availability parameters per site: stream order (according to Strahler)
Source: ECRINS v1.1
availability parameters per site: slope
Source: EUDEM
availability parameters per site: altitude
**Dataset:** MARS spatial database

**Source:**
- EU DEM
- GRDC - EWA

**Available parameters per site:**
- discharge

**Physico-chemistry data:**
- total P, ortho P, nitrate, total N, ammonium, hardness, TOC (total organic carbon), oxygen content, BOD5 (biochemical oxygen demand), water temperature, pH, conductivity, chlorophyll, Secci disc depth, suspended solids

**Other physico-chemical parameters:**
- chemical oxygen demand, dissolved organic carbon, dissolved oxygen, Kjeldahl nitrogen, silicate

**Availability of physico-chemical data, if there is more than one sample per site:**
- mean values per site

**Comments:**
- These are yearly average data measured at WISE SoE quality stations. For catchments (FEC) we have calculated nitrogen and phosphorus inputs in tonne per year.

**Stressors influencing the sites:**

<table>
<thead>
<tr>
<th>Stressor</th>
<th>Restored sites available</th>
<th>Data before/after restoration available</th>
<th>Stressor gradient available</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eutrophication</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>TotP, total N, orthophosphate concentrations</td>
</tr>
<tr>
<td>Hydromorphological degradation</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>alteration of natural riparian habitats</td>
</tr>
<tr>
<td>Organic pollution</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>represented by BOD5, ammonium and nitrates</td>
</tr>
<tr>
<td>General degradation</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>EQR of invertebrates, EQR of macrophytes</td>
</tr>
<tr>
<td>Hydrologic stress (e.g. impoundment, flow velocity reduction, hydropoeaking, water abstraction, flow velocity increase)</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>Flow alteration ratio (abstraction/no abstraction)</td>
</tr>
</tbody>
</table>

**Comments:**
- Proxy stressors for eutrophication are also: 1) share of agricultural land in catchment (upstream drainage area), in local drainage area (FEC = functionally elementary catchment) and along the river (buffer/strip area), 2) level of urban waste water treatment, 3) population density and 4) data on agricultural activities such as total yearly input of N and P (tonnes/year).
Other specifications

GIS layers, shapes related to the dataset:
- hydrological information (as HydroSHEDS)
- catchments, river-sub-basins
- land use
- dams/reservoirs/barriers
- protected areas
- population density
- environmental variables (freshwater or terrestrial)
- climatic variables (current and predictions)
- others/specific

others (specify):
- polygons: EUROSTAT NUTS, country borders, coastal line, WFD ecoregions (Illies), biogeographical regions (EEA, Habitat Directive), broad hydroregions (IC fish), hydro ecoregions (Rebecca project), WWF hydro regions
- point objects: WFD surface water bodies (2010), WFD groundwater bodies (2010) WISE SoE stations, EFI+ stations

availability of photos: no
availability of maps: yes

quality control procedures:
- Were any quality control procedures applied to your dataset? yes

quality control protocols and comments:
- When linking point pressure/state data to ECRINS hydrological catchments and river network data, spatial quality checks were performed as well as attributive QA checks (river name check, (sub)catchment check).